

## COOPERATIVE STATE RESEARCH, EDUCATION AND EXTENSION SERVICE

### FY 2001 ANNUAL PROGRAM PERFORMANCE REPORT

The Cooperative State Research, Education, and Extension Service (CSREES) was created by the Department Reorganization Act of 1994 which merged the former Cooperative State Research Service and the former Extension Service into a single agency. The mission of CSREES is to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and extension programs in food, agricultural, and related sciences in partnership with both the public and private sectors.

CSREES is an enabling agency which provides Federal financial assistance, program planning and coordination, and leadership to a widely dispersed, university-based research and education system. Information regarding appropriation authorities and CSREES' programs can be found in the CSREES Strategic and Annual Performance Plans. Being an enabling agency providing funds to universities, CSREES relies on the Congressionally mandated Plan of Work and Annual Report of Accomplishments and Results from the university partners for performance information regarding formula funded research and extension programs. This is mandated in the Agricultural, Research, Extension and Education Reform Act of 1998 (AREERA). The Annual Report is received in March of each year as stated in the Guidelines published in the Federal Register. Thus, the data included in this report reflects the formula funded effort of the university partners for the period October 1, 1999 - September 30, 2000. The formula funded report data for FY 2001 will not be available until it has been reviewed and finalized. A summary will be available in June and will be reported in the 2002 GPR Performance Report due next year.

Only federal employees were involved in the preparation of this report.

CSREES PERFORMANCE SUMMARY	
Strategic Goal/ Management Initiative	FY 2001 Performance Goals
Goal 1: An agricultural production system that is highly competitive in the global economy.	Develop new and value added products
	Improved animal production systems.
	Reduce production costs and improve environmental stewardship
Goal 2: To provide a safe and secure food and fiber system.	Develop and improve detection and prevention methods
	Develop improved surveillance and education programs.
	Minimize threats to plant and animal production
	Enhance Risk Assessment and Management Strategies
Goal 3: To achieve a healthier, more well-nourished population.	To improve the health of citizens through changes in diet, quality of food, and food choices.
	Molecular and cellular basis of nutrition.
Goal 4: To achieve greater harmony between agriculture and the environment.	To develop, transfer and promote the adoption of efficient and sustainable agriculture, and other resource conservation policies that ensure ecosystem integrity and biodiversity.
	To develop, transfer and promote efficient and sustainable technologies that protect water quality.
	To understand the impacts (benefits and harmful effects) of global environmental change
	To understand the compatibility of agricultural practices on the natural resource base and environment.
Goal 5: To enhance economic opportunity and the quality of life among families and communities.	To improve approaches for understanding changing characteristics of communities and families.
	Improve economic and social indicators of community well-being.
Goal 6: Management Initiatives	To achieve interdisciplinary, interfunctional projects and transfer technology from agricultural research laboratories to producers, processors, distributors, consumers and other users of the benefits.
	To demonstrate long-term economic growth, and sustained well-being of rural communities.

CSREES PERFORMANCE SUMMARY	
Strategic Goal/ Management Initiative	FY 2001 Performance Goals
	To conduct stakeholder listening sessions to provide an overview of research and education programs, identify priorities and provide opportunities for participation in program implementation from a broad range of universities, institutions and organizations.
	Identify and foster partnerships with other Federal agencies to increase support for CSREES sponsored activities.
	Utilize the broad authorities of CSREES to manage its funding authorities and link to funding and priorities of other agencies and organizations to address emerging research and education issues.
	Implement new initiatives under competitive grants authorities (IFAFS and Section 406) - Biobased products, Invasive Species and International Science and Education.
	Continue the implementation of the improved CRIS classification and taxonomy areas to improve customer relations, research planning and reporting and other user-friendly attributes.
	Plan, implement and maintain the Research, Extension and Education Information System (REEIS) for use by the REE agencies, USDA, and others interested in accessing project information and performance measures supportive of the accountability mandates.
	Provide clean, timely and accurate audit opinions on audited financial statements and prepare and submit the yearly Consolidated Financial Statements in accordance with USDA prescribed procedures, and as required under the Chief Financial Officer's Act.
	Fully comply with the Debarment and Suspension and Drug-Free Workplace regulations expected of grant recipients.

**Goal 1:** An agricultural production system that is highly competitive in the global economy.

**Objective 1.1:** To produce new and value-added agricultural and forest products and commodities that are sustainable and increasingly competitive in the international marketplace.

#### Key Performance Goal

<u>Develop new and value added products</u>
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CSREES funding has resulted in increased earnings for farmers through developing new and value-added agricultural products.

**Wyoming** research studies indicate that the cost per ton of windrowed forage was about half that for hay baled, stored, and fed (\$17.61 vs. \$34.69). First year results from the variable rate application of Telone II for SBCN control showed that a uniform application of Telone II would result in a net return of \$21/acre, with sugar beets priced at \$42/ton. Applying the optimum Telone II rates would increase net returns to \$89/acre. In addition, the variable rate would have saved 36 gallons of product per acre.

For all producers who participated in the Quality Assurance (QA) feeder cattle program in **West Virginia**, the average value-added increase in income is about \$1,200 per farm. The calves marketed through the QA program developed a good reputation for performance and quality.

Scientists in **Vermont** have developed whey protein-based edible films. The films are thermally sealable with good integrity, thus deemed suitable as tamper-evident packaging. The films are biodegradable and digestible. The food and pharmaceutical industry, as well as consumers may benefit from using the new biodegradable films in product packaging system to minimize the loss due to tampering.

As a result of research in **Utah**, low fat red meat products from lamb, beef, and pork have been developed and are currently at various stages of commercialization. Ultra high temperature milk processing has been developed which extends unrefrigerated milk life up to a year and the product is under commercial production and has been utilized by the U.S. military. Several new varieties of food and feed grains have been developed which are resistant to Utah and Intermountain West diseases and pests. These varieties have been or are being released for commercial production. A process of utilizing *apomixis* (i.e., the ability for hybrids to clone themselves) has been developed and is close to commercialization. This would allow hybrids to be produced from hybrid seed, rather than from the seeds of two or more parents and would greatly reduce the cost and improve the quantity and quality of many foods and feeds. It has been shown the CLA (a product found in dairy products, particularly those obtained from fresh pasture) is effective in reducing various forms of cancer, though work continues in this area.

**South Dakota** has developed a new corn gum product that helps prevent erosion. South Dakota State University scientists have discovered a means to transform agricultural by-products into a product that is profitable and environmentally friendly. Using the by-products of ethanol production, the researchers have created a corn-based gum product that can be used in different types of applications, replacing other synthetic gums that are imported into the United States. The new gum product is blended with grass fibers or waste paper pulp and mixed with grass seed, creating a biodegradable grass seed/mulch product. This grass seed & mulch is spread on bare roadsides or torn up construction sites. As the grass begins to grow, the corn-gum mulch decomposes, protecting the soil from erosion without leaving an environmentally hazardous residue. The new corn-based gum may replace similar imported gums, which are more expensive.

Scientists at **South Dakota** State University and **Iowa** State University have developed a soy protein-based adhesive capable of bonding agrifiber without compromising water resistance characteristics. Soybean straw and wheat straw, when bonded with the soy-based adhesive, have mechanical and water resistance properties comparable to wood fiber based panel boards. The new soy protein-based adhesive provides another panel fiber source to help satisfy increased consumer demand, without creating an additional strain on limited natural wood resources. The new product also creates a new market for soy protein as an adhesive.

Rutgers, **New Jersey**, has designed a multidisciplinary program of research and technology transfer to develop value-added products to revitalize the blueberry industry. Rutgers has created a cooperative company, called Blueberry Health, Inc., to handle marketing of the products. "Jersey Blues" iced tea was introduced for sale at approximately 50 farm stands and several county fairs in New Jersey. So far, approximately 1000 cases of the iced tea have been sold. Consumer surveys indicate a 90 to 95 percent acceptance rate of the product.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Objective 1.2:** To increase global competitiveness of the U.S. agricultural production system.

**Key Performance Goal:**

<u>Improved animal production systems.</u>
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**West Virginia** scientists found that *in ovo* treatment with chicken growth hormone increased feed efficiency in broilers approximately 5 percent with a 20 percent faster growth rate which occurred mostly in breast and leg muscles. They also found that feeding trout a high energy (18 percent fat vs. standard 11 percent), high protein (48 percent vs. standard 38percent) resulted in a 50% increase in weight gain.

Scientists in **Wisconsin** have genetically engineered the Mengo virus to control an outbreak of the Encephalomyocarditis virus (EMCV), which kills many animal species in zoos and research institutions, in a colony

of primates. Also, it has been tested on 24 species in zoos in New Orleans and Miami. Those tests indicated that there were no complications from the vaccinations. Blood tests indicated that the vaccinations would likely protect primates and many other animals from EMCV. Similar vaccines may one day be used in humans as well as animals. The scientists believe such vaccines would be many times safer than polio vaccines.

Scientists in **Virginia** with the Virginia-Maryland College of Veterinary Medicine have created a genetically altered live vaccine for swine pleuropneumonia that confers excellent immunity in pigs with minimal side effects. The vaccine has recently received final approval from the U.S. Department of Agriculture, and is now being marketed commercially as an agent to prevent pneumonia in pigs. In doing so, it has become the first avirulent live vaccine ever approved for preventing bacterial respiratory disease in animals.

As a result of an Extension education program in **South Dakota** on the risks of nitrate poisoning, livestock producers protected nearly a million dollars worth of cattle from nitrate poisoning with just \$800 in nitrate forage testing.

In **Mississippi** the trematode parasite disease in channel catfish caused significant losses on several fish farms with white pelicans as the likely cause of late season parasite problems as they infect snails that live in catfish ponds. When summer populations of white pelicans were spotted in the Delta, Mississippi State University publicized this fact and distributed updated information on the trematode and recommended actions. Farmers immediately treated 400 to 500 acres of ponds to reduce snail populations in ponds visited by the pelicans. A quick response helped producers avoid estimated losses of 10 percent of fingerlings and foodfish production on over 300 acres. With an estimated loss avoidance of \$250 per acre, the value of the program was around \$75,000.

Recently completed research in **Mississippi** confirmed that immunity levels of newborn dairy calves tube-fed colostrum at birth were higher than those that nursed their mothers. Calves that were allowed to nurse their mothers had consistently lower immunity levels than the calves that were fed a gallon of colostrum. University officials promoted this practice extensively across the state, and today most producers are using this technique, with a subsequent decrease in calf deaths.

**Oklahoma** Extension developed a decision-making tool in the form of a computer software package and complete educational material package called OSU Cowculator. The package included the software, slide set with suggested text, and a fact sheet. More than 2,500 versions of Cowculator have been distributed. In addition, nine land-grant institutions are using the software in their beef production courses. Use of under-priced feed commodities has increased nearly twofold in Oklahoma in the past three years. Part of this dramatic increase has been caused by changes in market conditions and extreme drought in some parts of the state. Many producers have been able to use the Cowculator to survive and even make a good profit in an otherwise severe production and economic situation. Estimated total impact is more than \$5 million.

**Nevada** scientists have crossed Rambouillet ewes with pure Merino rams imported from Australia. Over the past 10 years crosses and back-crosses between mixed lambs and pure Merino rams has resulted in approximately 50% of the 1000 ewe flock are approaching purebred Australian Merino status, a known high quality wool producing breed. By taking advantage of the breeding program being developed on University of Nevada's research ranches producers are able to add value to their sheep production system. By improving genetic stocks, University of Nevada's Merino X Rambouillet hybrid flocks are producing a 90% cleaner wool than the national average and a 15% improvement over indigenous Australian flocks. Lamb production has also improved significantly and ewes are averaging 25% more pounds of lamb per ewe over the western U.S. average and almost double the pounds of lamb per ewe when compared to Australian Merino flocks.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Objective 1.4:** Reduce production costs and improve environmental stewardship.

**Key Performance Goal:**

<u>Reduce production costs and improve environmental stewardship.</u>
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Implementing no-till practices on grain farms increased profits to farmers in **Washington** and reduced health risk to state residents from airborne dust. Further research has lead to a recommendation for bee keepers to reduce their treatment for mites by one treatment per year, which saved \$8.80/hive for a savings of \$457,600/year for **Washington** bee keepers.

In **Oregon**, Willamette Valley grass seed growers reduced the number of acres burned by more than 70 percent. At the same time, grass seed crops increased from 332,610 acres in 1988 to 479,800 acres in 2000. This reduction in field burning has occurred without a loss in seed yield or quality, and sales climbed from \$190 million in 1988 to more than \$325 million in 2000. In addition, baling of seed crop residue has created a grass straw export market. In 1999, straw balers and handlers exported approximately 500,000 tons and sold another 50 tons in domestic markets. This new commodity is valued at over \$23 million.

Based on research in **Oregon**, producers are now delaying the first nitrogen application and many are reducing nitrogen rates by as much as 25%. The research has shown that foliar feeding of nitrogen is not effective in strawberry. This will save many strawberry growers as much as \$400/acre. High-density plantings in blueberry have produced 104% greater yield over 7 years of production compared to the traditional 4' in-row spacing. Over 250 acres/year, for the last 3 years, have been planted at 30-36" in Oregon (and a similar acreage/year in Washington) as a result research findings. Moreover, a "no prune" system developed in 'Marion' blackberry has produced higher yields as plants are more tolerant to cold stress, reduced pesticide requirements, but must be hand harvested due to potential increased thorn contamination in machine-harvested no-prune systems.

The **North Dakota** State University Extension Service showed that it cost up to 3 cents less per pound to finish cattle in North Dakota compared to an out-of-state feedlot. Extension information prompted a group of cattle producers to pool funds and custom feed more than 1,300 head in North Dakota feedlots. With help from Extension specialists and agents, they realized a return of more than 31percent last year. Another group built a 7,000-head feedyard in Bowman County. Other producers will earn a premium of up to 3 cents per pound for cattle that meet processing specifications of a new local processing company. More than 130 producers attended Extension feedlot schools last year.

In **North Carolina**, 9350 producers adopted best management practices in such area as pest control, tillage, fertilization, labor management, etc, that increased their yields. 17,838 producers increased their awareness and knowledge of production systems. 6,044 producers adopted practices that lowered production costs or kept production costs below income from the farm. 1,161,365 acres were affected. All of this contributed to stabilizing or increasing the number of farms and the crop acreage on 4224 farms and 92,090 acres. This resulted in increased profits through adoption of practices such as choice of high yield varieties, tillage, pesticide application timing, improved marketing of \$9,939,682 and reduced costs through improved pest management of \$6,189,800.

Rice prices were poor in 2000 and producers were faced with dramatically increased fuel prices. Fuel to operate water pumps is a major cost of rice production, so any reduction in this cost benefitted farmers. The **Mississippi** State University Extension Service held four rice meetings in the Sunflower County area to introduce an alternative method of watering rice fields that saves pumping cost. Both producers and consultants attended the meeting. This alternative method of watering rice fields saves as much as 30 percent in water use, for an average of \$20.36 per acre saved in fuel costs. If each farmer adopted this method, the total savings to the south Delta crop would be \$1.85 million.

Farmers in **Mississippi** have routinely applied a combination of Roundup and 2,4-D herbicides to burn down winter weeds on row crop fields and prepare about 100,000 acres for spring planting. These materials cost \$10.20 per acre

in 2000. The Mississippi State University Extension Service advised these farmers to use a banded application of Gramoxone Extra restricted to the tops of the rows rather than their normal burndown herbicide program. This banded application costs farmers about \$3.87 per acre and was done along with the planting, saving an application cost. Farmers used this method on an estimated 5,000 acres of corn. The farmers who followed this recommendation saved \$6.33 per acre on herbicide costs for a total savings of \$31,650 in chemicals alone. An additional application cost on these 5,000 acres would have averaged \$15,000, bringing the total savings to \$46,650.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Goal 2:** To provide a safe and secure food and fiber system.

**Objective 2.1:** To improve food safety by controlling or eliminating food-borne risks.

#### Key Performance Goals

Develop and improve detection and prevention methods.

CSREES funding is enabling research and development of rapid detection methods to improve food safety by controlling or eliminating food-borne risks.

**Arkansas** scientists developed an immuno-electrochemical biosensor system coupled with immuno-magnetic separation to detect Salmonella typhimurium in chicken carcass wash water. The method can enumerate Salmonella in 2 hours with a detection limit of  $1 \times 10^3$  cell/ml. A bienzyme electrode was developed for the biosensor system to improve sensitivity (E. coli O157:H7, 200 CFU/ml). The results of this project could provide the food processors with a new technology to detect pathogens in foods in less than 2 hours with acceptable detection limits. The food industry could save millions of dollars annually by avoiding product recalls. Consumers could benefit from reduced food borne diseases and related medical costs.

Using pulsed-field gel electrophoresis, **Arkansas** researchers constructed a DNA database of Campylobacter jejuni strains isolated from pre-chill chicken carcasses, post-chill chicken carcasses, whole chicken carcasses purchased at retail, and humans. Virtually all of the Campylobacter jejuni isolated from chicken carcasses show a high level of cytotoxicity, regardless of the point from which the chicken carcass was taken. The human isolates studies show similar results. The PFGE study shows that genetically identical Campylobacter jejuni can be isolated from different chicken carcasses. Many outbreaks of food borne pathogens result from exposure to a common source. By providing accurate information concerning specific DNA evidence on the source of the food borne bacteria, the food companies will benefit economically by being able to pinpoint areas and situations in their food processing that are sources of potential food borne bacteria. Thus, the companies will have a higher probability of correcting these problems and providing a safer product for the consumer. Other uses for this type of database is eventual detection of pathogens in raw food products and/or products after processing. It can go hand-in-hand with other newly developed techniques such as hydrodynamic pressure in prevention/detection of food borne illness.

Current procedures used for detecting E. coli O157:H7 contamination of food products typically require at least two days to yield conclusive results. Researchers in **California** has bridged this gap by providing a sensitive test that can be completed in 8 hours and provide a definite 'yes' or 'no' answer for potential contamination of a food sample. This test is extremely sensitive and can detect even a single captured viable cell of E. coli O157. Experiments are in progress to extend the strategy to other important food-borne bacterial pathogens, Vibrio vulnificus and Salmonella enteritidis, commonly found in association with seafood and poultry, respectively. More rapid detection of E. coli contamination of food samples can provide an earlier warning so that the food isn't eaten. It could save lives.

**Georgia** developed a procedure using immunocapture beads together with flow cytometry to reduce analysis time of *E. coli* O157:H7 to as little as 6 hours. As few as 4 cells of *E. coli* O157:H7 can be detected in food samples in as little as 6-8 hours.

Researchers in **Cornell's** Department of Food Science have developed collaborations in New York and other states to develop a large, improved rapid methods for molecular subtyping ("DNA fingerprinting") of *Listeria monocytogenes* and to develop a database of *L. monocytogenes* DNA fingerprints. Fingerprinting of *L. monocytogenes* isolates from human cases occurring in New York and other selected states allow early detection of human listeriosis outbreaks. Fingerprinting of *L. monocytogenes* isolates from foods will help to detect possible linkages of specific food products to disease outbreaks. Fingerprinting data for all isolates are also assembled into a database, which is analyzed for correlations between specific subtypes (as determined by DNA fingerprinting) and their likelihood and ability to cause human and animal disease. This database will be made available through the World Wide Web to allow broad access to the data. The work has been crucial for the early detection of at least three human listeriosis outbreaks. One outbreak in 1998/1999 was linked to the consumption of deli meats and hot dogs and caused more than 100 human cases, including at least 20 deaths. Another outbreak in the fall and winter of 1999/2000 was linked to the consumption of pate and caused illnesses in at least 10 people. In both outbreaks, the work contributed significantly to the early detection of each outbreak, thus preventing additional human illnesses and possible deaths. A third outbreak is currently under investigation. The efforts from these collaborative efforts have also been honored with a 2000 USDA Honor Award to the *Listeria* Outbreak working group. The *Listeria* fingerprint database has already provided some important initial new data on the existence of specific *L. monocytogenes* subtypes, which appear to have lost the ability to cause human disease. Further definition of specific subtypes that do not represent a human health hazard will have a significant positive impact on the food industry by possibly preventing unnecessary costly recalls of foods that may be contaminated with low levels of *L. monocytogenes* and lack the ability to cause human disease.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

<u>Develop improved surveillance and education programs.</u>
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Evaluations of the **Expanded Food and Nutrition Education Program (EFNEP)** show that EFNEP adult graduates learn valuable skills of benefit not only to themselves but also to society. Results based on data from 106,062 graduates show that as a result of this program, 67 percent improved in one or more of the food safety practices such as thawing and storing foods properly. Moreover, 45 percent of 130 pregnant women participants surveyed are preventing listeria by heating hot dogs, lunch meats, cold cuts and deli meats until steaming hot.

**Virginia** Cooperative Extension conducted two acidified foods workshops (multi-state cooperation) in Virginia and West Virginia to allow companies to meet FDA regulations. All the participants received certification and registered their products with FDA. Without this certification these companies could not continue to stay in business. Inspection of the facilities by food regulators indicate that 100% of the participants trained are following procedures learned in the workshops.

As a result of taking the **Texas** Agricultural Extension Service Food Protection Management course, food managers were expected to train their food service employees in safe food handling practices. A telephone survey was conducted by the Public Policy Research Institute (PPRI) at Texas A&M University to determine the practices of food service employees both before and after the managers had taken the course. This survey involved a sampling of food service managers (378) who had taken the Texas Agricultural Extension Service Food Protection Management course. The survey found that 95% of the participants had shared the information gained from the course with their food service employees. As a result of the training employees of participants significantly increased use of thermometers and other control measures to monitor temperatures of foods, increased adoption of practices to prevent cross contamination, increase in use of proper hand washing procedures, used proper cleaning and sanitizing

procedures for equipment, utensils, and food preparation surfaces, and adequately labeled foods upon receipt and during storage.

Of the 91,235 adults and youth who received food safety education in **Tennessee**, 71,342 planned to adopt or adopted one or more food safety practices. More than 41,000 washed their hands before and after handling food, 14,972 cleaned surfaces and utensils that came in contact with food, 8,814 purchased safe food, 17,264 cooked food to safe temperatures, 27,638 refrigerated perishable foods within two hours, 3,475 thawed frozen foods using recommended practices and 16,491 preserved food safely. If 856 to 1,498 of the 71,342 individuals (based on a national percentage of 1.2 to 2.1 percent of individuals who contract food borne disease annually) who planned to adopt or adopted one food safety practice did not contract a food borne illness, the potential savings for Tennessee would be \$171,200 to \$9,262,134.

In **Nebraska**, at least 95 percent of ServSafe participants pass a national certification test following training. Managers report increasing their knowledge of safe food handling techniques that can reduce the risk of food borne illness by an estimated 33 percent. Managers report more conscientiousness about food temperature, cleaning and hand-washing. Each manager, in turn, is estimated to teach the food safety information to another 15 people, greatly extending extension's efforts.

In **North Carolina**, 2,591 food service managers completed 71 county-based programs and 2,105 food handlers completed 746 classes. Of those completing these programs, 1,992 service workers and 2,159 food handlers adopted safe food handling practices.

Through collaborations with the 4-H program, the Nutrition Assistance Program (NAP), the Public School System, and the Department of Public Health, EFNEP and the Nutrition, Diet and Health program has reached over 1500 families throughout the **Commonwealth of the Northern Marianas Islands (CNMI)** in the last year. In addition, there was about 70 youth and families with young children throughout the CNMI enrolled in EFNEP. According to the EFNEP evaluation report, more than 75% of the graduates showed improvement in one or more food resource management practices such as planning meals, comparing prices, using grocery lists, and not running out of food or cutting children's meals because there was not enough money to prepare them. Meanwhile, 86% of the graduates demonstrated acceptable food safety practices such as thawing or storing food properly. Also, over 85% of youth from the pilot project *The Summer Youth Program (SYP)*, demonstrated the ability to wash hands properly, to avoid cross-contamination, and to use temperature control when handling food.

In a "train-the-trainer" session, **Purdue** extension educators in Vermillion County provided food safety training to 30 staff members of groups homes and assisted living facilities. The staff members were taught food safety procedures and given four-ingredient recipes that can be safely prepared by developmentally disabled individuals. Fifty-three developmentally disabled individuals have been taught how to safely prepare food. This allows them to become more healthy and self-sufficient.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

#### Minimize threats to plant and animal production.

In 1999, the plum pox virus was discovered in North America. The virus devastates stone fruit such as peaches, plums, nectarines and cherries. Making its first appearance in Pennsylvania, plum pox endangered the state's \$25 million-per-year industry and potentially threatened stone-fruit production nationwide. **Penn State** teamed with state and federal agencies, growers, legislators and citizens to develop a rapid-response team to stop the spread of the virus. Infected trees were identified and burned, and funds were secured to help affected farmers stay in business.



Prospects are very strong that Pennsylvania's plum pox virus has been stopped in its tracks.

Researchers at **Colorado** State found that carbon dioxide given off by corn attracts western corn rootworm larvae. They developed a formulation of granules that produces the gas to lure the pests away from the corn. The technique also is proving effective in attracting and trapping termites.

Turnips lured sugar beet nematodes away from sugar beets in **Wyoming** research. If turnips were used as a trap crop to protect sugar beets on 7,200 acres in the state, producers would save nearly \$1 million in nematicides that are among the most toxic of agricultural chemicals.

Scientists at **North Dakota** State developed a micro-rate application plan for applying herbicides combined with seed oil to sugar beets. The practice cuts herbicide rates up to 75 percent. A survey showed more than 95 percent of sugar beet growers in the Red River Valley of North Dakota and Minnesota have adopted the practice, saving more than \$20 million. Researchers are adapting the practice to corn and other crops in the region.

**Wisconsin** research on Quadris -- a new fungicide that is less toxic and used in smaller amounts than previous compounds -- accelerated U.S. Environmental Protection Agency evaluation of Quadris, which it approved in 1999. Entomologists found that planting potatoes a quarter mile from the previous year's potato fields reduced Colorado potato beetle problems by 85 percent. They also showed that new, reduced-risk pesticides would control potato beetles while leaving beneficial wasps in place to control aphids that attack the crop. The research has helped growers reduce chemical use, adopt less toxic compounds and rely more on cultural practices and biologically based methods to keep pests in check.

**New York** research has found that barriers made of copper strips are 100% effective in preventing snails from moving into the grape canopy. Although the initial expense for materials and labor is high, the barriers provide excellent control for several years at virtually no risk to the environment. The wholesale price on a truckload—20 bins—of grapes is \$5,400, so a grower who has their entire load rejected because of a snail in one bin stands to lose a lot.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

#### Enhance Risk Assessment and Management Strategies

The effectiveness of irradiation in controlling microorganisms in beef is well known, but additional study has been necessary on the effects of low- to medium-dose irradiation when combined with freezing, precooking, and packaging on pork, ground beef, and beef muscle. **Kansas** Research and Extension has conducted tests on the reaction of these meats to irradiation. The findings concluded that irradiated beef responded extremely well when vacuum-packed. Bacterial counts remained low, and color and taste were unaffected. Irradiation is an economical way of safely treating meat products. Irradiation could provide an extra margin of safety from food borne pathogens. If processors build irradiation facilities next to their processing or distribution centers, the costs could be as low as about 1 cent per pound. If the irradiation has to be contracted out, it could cost 5 cents to 7 cents per pound. Domestic and international wholesale buyers, consumers, producers, and sellers face significant market pressures for safe meat products produced under well-controlled hygiene. All indications are that these market pressures will intensify.

When meat is irradiated, there is a breakdown in the fat molecules, which can cause off odors or flavors. **South Dakota** State University scientists have discovered a way to insure food quality in irradiated red meat. By using

antioxidants to slow the breakdown of fat, scientists were able to effectively reduce rancidity while controlling food-borne disease and food loss due to microbial spoilage. The antioxidants are introduced with a "carrier" propylene glycol, which is also present in many other processed foods. Just a very small amount of antioxidant is needed to slow rancidity, only about two one-hundredths of one percent of the fat content in meat. Natural antioxidants such as rosemary and sage were both effective in reducing the rate of rancidity, but synthetic antioxidants were found to have slightly better results. Irradiation of red meat is one method of controlling E. Coli 0157: h7. Previously, irradiation caused meat to develop an off-flavor and off-odor. However, the SDSU breakthrough means that irradiation now could be a viable alternative for companies to eliminate their liability of E. Coli 0157: h7 contamination, especially in ground beef. This breakthrough has insured that irradiation of meat can be accomplished without the loss of quality.

**Arkansas** scientists developed models for predicting survival/growth/destruction of *S. typhimurium* and *C. jejuni* on chicken carcasses and in processing water. A cross-contamination model for poultry chilling process is also being studied. A risk assessment model has been developed based on the collected and reported data using Monte Carlo simulation with Analytica software. The risk model can present the probability of microbial hazards in terms of percentage of contaminated carcasses or pathogen level of each carcass for given processing conditions. The predictive microbial models will provide poultry processors with a tool to analyze the survival/growth/ destruction and cross-contamination of pathogens on poultry carcasses and in processing water under various processing conditions. The microbial risk assessment model will assist the poultry processor in their HACCP programs and risk management in a quantitative way. Consumers will benefit from safer poultry products and the society will benefit from reduced food borne diseases and related medical costs.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Goal 3:** To achieve a healthier, more well-nourished population.

**Objective 3.1:** Optimal Health through improved nutrition.

#### Key Performance Goals

To improve the health of citizens through changes in diet, quality of food, and food choices.

In **Washington** as a result of 30,808 people participating in the Family Nutrition Education Program, 46 percent improved meal planning, 59 percent improved on using the Food Pyramid, 41 percent improved grocery shopping practices, 42 percent improved limiting salt in diet, 51 percent improved reading labels, 47 percent improved eating vegetables and fruit, and 54 percent improved choosing lower fat foods. Similar results were reported in many other states.

Researchers in **Texas** have developed a maroon carrot which is expected to bolster carrot sales and generate millions in revenue for seed companies and producers. Because of the carrot's sweetness, it's expected that more children will eat the maroon carrots--promotions are being planned using cartoon characters. The 'BetaKing' maroon carrot is being sold as 'BetaSweet' throughout the US, Canada and Australia. BetaSweet maroon carrot will impact the consumption & expand production as it is appealing to health conscious consumers as a good source of carotene & anthocyanins.

Evaluations of the **Expanded Food and Nutrition Education Program** (EFNEP) show that EFNEP adult graduates learn valuable skills of benefit not only to themselves but also to society. Results based on data from 106,062 graduates show that as a result of this program, 87 percent of participants improved in one or more nutrition

practices (i.e., makes healthy food choices, prepares food without adding salt, plans meals, reads nutrition labels or has children eat breakfast), 83 percent improved in one or more food resource management practices (i.e., plans meals, compares prices, does not run out of food or uses grocery lists). Moreover, 93 percent of the graduates measured showed positive change in at least one food group on the Food Guide Pyramid at exit.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

#### Molecular and cellular basis of nutrition.

A researcher in **Nebraska** developed an entire poultry management system for economically producing eggs rich in omega-3 fatty acids. Flax seed, a significant source of omega-3 fatty acid, is a key feed ingredient in the patented Omega egg production system. Each Omega egg produced using the system contains 350 milligrams of omega-3 fatty acids compared with 40 milligrams in conventional eggs. They're also lower in cholesterol. Eating up to two Omega eggs can reduce blood serum triglyceride levels 14 percent. High triglyceride levels are one risk factor for heart disease. Omega-3 fatty acids also have been shown to increase the ratio of good to bad cholesterol and reduce the occurrence of blood clots, another heart disease risk factor.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Goal 4:** To achieve greater harmony between agriculture and the environment.

**Objective 4.1:** To protect the natural resource base to ensure both sustainability and economic viability for multipurpose use (e.g. agriculture, forestry, wildlife, recreation, etc.)

#### **Key Performance Goals**

To develop, transfer and promote the adoption of efficient and sustainable agriculture, and other resource conservation policies that ensure ecosystem integrity and biodiversity.

**New Jersey** researchers have developed several promising biological remediation technologies for soils. Phytoremediation uses certain varieties of plants to accumulate toxic metals such as chromium, lead, and cadmium from contaminated soils. And a sequential treatment process for remediation of soils impacted by hydrophobic hydrocarbon contaminants has also been developed. Phytoremediation technology is being used to clean up the site of the former Magic Marker plant in Trenton. Because of the tremendous need for more effective approaches to remediate soils contaminated with highly hydrophobic organic contaminants, the sequential treatment process has attracted a great deal of industrial interest, particularly among the electric and gas utilities. In addition, two environmental technology companies have expressed interest in licensing the technology.

**Nebraska** scientists have developed a simple method of effectively attenuating a variety of pesticides quickly by mixing iron and water into pesticide-contaminated soil. The technique involves windrowing soil with earth-moving equipment and mixing it with a high-speed soil mixing and fracturing implement. Iron particles and water are added during mixing. Windrows are covered with plastic sheeting and kept moist for three months. This technique eliminates up to 95 percent of the contamination, allowing once-toxic soil to be returned to the ground. This approach is adaptable to many contamination situations, uses readily available material and equipment and can be easily taught to almost anyone.

Over 63,000 insects were redistributed by **Washington** Extension for Diffuse and Spotted Knapweed, St. Johnswort,

and Dalmatian Toadflax on over 136 new sites across Okanogan, Ferry, Stevens, Pend Oreille Counties, and the Colville Reservation. Characteristics recorded for these sites and mapped using a Geographical Positioning System are entered in a database for future monitoring and evaluation. Biocontrol adoption has led to a 25-30 percent decline in herbicide applications to control knapweed and yellow starthistle, resulting in financial savings and improved environmental quality.

**Washington** researchers have shown that the use of pheromones for insect management has reduced broad-spectrum pesticide use by 75% in many apple orchards. The development of aggregation pheromones as a monitoring tool and potentially a control strategy for stink bugs will reduce crop losses from this pest group that is a major threat to “soft” pest management programs. Annually updated pest management recommendations are adopted by tree fruit growers thus saving growers money

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

To develop, transfer and promote efficient and sustainable technologies that protect water quality.

**Washington** scientists have demonstrated long-term improvements in water quality through alum injections and hypolimnetic oxygenation in selected lake ecosystems impacted by urban development and watershed degradation which has resulted in significant improvements in two eastern Washington lakes. This technology is now being applied to additional lakes in the area exhibiting similar problems, with the potential for additional gains through follow on research efforts.

As a result of **Virginia** Extension Education, a network of volunteers assisted in monthly water sampling in the Page Brook watershed. Results from the data collected on fecal source tracking indicated that livestock were a major contributor to fecal pollution in Page Brook. As a result of this information, farmers voluntarily fenced livestock away from streams, established watering points or in-pasture water stations, and developed riparian zone vegetation along the streams. Within less than a year, populations of fecal bacteria in the stream declined by over 90%.

In **Tennessee**, use of no-till for major crops exceeded 50% of acreage for the first time ever. No-till use in cotton reached 300,000 acres, or half of all cotton planted. The additional 300,000 acres of no-till on Tennessee cropland is estimated to reduce soil erosion by three million tons annually and to save at least 7.5 million dollars in off-site damage by sediment.

**Colorado** scientists have developed a biosensor for atrazine. No other device for inexpensive, continuous, real time, in situ monitoring of atrazine has been developed. Sensors of this type are useful for monitoring water supplies (ground, surface, or waste water), especially if sensors for different compounds were bundled together. Since atrazine is a widely used herbicide, this biosensor is of importance to the agricultural community.

In **Missouri**, twenty communities received intense education on best management practices to reduce the potential for pesticide run-off and leaching. Two cities in Northeast Missouri were able to reduce pesticide levels in the raw water from 60 ppb to 6 ppb. This resulted in each city saving more than \$30,000 a year in treatment cost to remove pesticide from the public drinking water supply. The farmers in the watersheds adopted a two-pass pesticide system of application and saved an average of \$10 per acre or more than \$14,000 each year.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

To understand the impacts (benefits and harmful effects) of global environmental change.

**Nebraska** researchers at the National Drought Mitigation Center helped develop and now maintain a new nationwide drought tracking system, called the Drought Monitor. The Drought Monitor fills a nationwide need for timely, user-friendly information to improve drought tracking and to characterize its severity. It's estimated that more than a million people used the monitor in its first year. Major media nationwide, including The Weather Channel, use the monitor in some form. While it was primarily designed for drought and water planners, the monitor's wide use and simple format are increasing public awareness of drought. Alabama, Florida, Georgia, Oklahoma, Nebraska and South Carolina are among numerous states using the Drought Monitor in some form to better monitor, plan and respond to drought.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

To understand the compatibility of agricultural practices on the natural resource base and environment.

In collaboration with other agencies, **Nevada** Extension and Experiment Station conducted a project to evaluate the effectiveness and practicality of controlled sheep grazing. The sheep were brought in to create a fuel break along the urban-wildland interface of Carson City, an area known for its propensity to burn. The sheep reduced the amount of wildfire fuel from 700 to 2,000 pounds per acre, depending upon the treatment. In addition, 71 to 83 percent of fine fuels, which burn easily, was removed; the height of fine fuels was cut reducing the length of flames during fires; and cheatgrass was trampled, also reducing the fire hazard. Nearly 90 percent of adjacent homeowners supported the project and preferred the sheep to other methods of creating fuel breaks. The results indicate that controlled sheep grazing is an effective and acceptable tool to create fuel breaks along the urban-wildland interface.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Goal 5:** To enhance economic opportunity and the quality of life among families and communities.

**Objective 5.1:** To increase the capacity of communities and families to enhance their own economic well being.

#### **Key Performance Goal**

To improve approaches for understanding changing characteristics of communities and families.

Through educational programming conducted statewide by **Virginia** Cooperative Extension, eight hundred eighty three (883) participants of the Money 2000 Program saved \$134,583 and reduced debt by \$745,155 for a total of \$879,738 in net family financial change. Similar results were realized in other states participating in the Money 2000 Program. More than 13,000 participants from 29 states have reported savings or debt reduction totaling nearly \$20 million. A cost-benefit analysis for **New Jersey** participants showed that for every one dollar Rutgers Cooperative Extension devoted to Money 2000 programming, participants increased savings and/or reduced debt by \$36.75.

Through **Virginia** Cooperative Extension, nearly 1,200 (1,188) participants of Home and Housing Education statewide increased their knowledge of choosing safe, affordable housing, and preventative home maintenance. Eighty-two percent of participants practiced home repair management skills, which resulted in approximate net savings of \$60.00 per month per household in repair costs (total estimated savings of over \$700,000).

Low-income, low-literacy consumers in **New York** frequently find themselves unable to meet the cost of electricity for their homes. As a result of an Extension education program, participants in the program have reported that because of their involvement with the Power Partner program they are now using a spending plan (92 percent), they pay their bills on time (88 percent), and they report having enough money to meet their monthly expenses (66 percent). The participants identified the educational materials designed by **Cornell** Cooperative Extension as a major factor in their behavior change.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

**Objective 5.2:** To increase the capacity of communities, families, and individuals to improve their own quality of life.

#### Key Performance Goal

<p><u>Improve economic and social indicators of community well-being.</u></p>
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By attempting to help families before crisis occurs, it is estimated Family Focus parenting programs in **New Hampshire** saved the state \$242,500. 1,488 parents, parenting 2,482 children, participated in Family Focus parenting education programs. Parents who attended a series of parenting classes gained knowledge in areas such as child development, child management, and effective parent-child communication. About 84 percent changed their behavior. Over half of the parents reported improved parent-child relations and child behavior.

In **North Carolina**, 55,357 children in quality child care demonstrated improvement in social-emotional, cognitive, and physical development as reported by parents, providers, and school personnel. This is the result of 1) 25,863 hours of training being provided to 3,610 school-age care providers, of which 2,685 of those reported an increase in knowledge, attitude, and skill; 2) 41,040 hours of training being provided for 8,109 center care professionals, of which 6,338 reported increases; and 3) 10273 hours of training was provided to 2,885 family child care providers, of which 2,021 reported increases. Moreover, 1,468 volunteers worked 21,619 hours at a value of \$216,190. The value of the program to North Carolina is \$5,491,454.

Comprehensive programs focus on character and leadership development, violence prevention, tutoring, parent education and family support. Alexandria County, **Virginia** 4-H reported that 60 youth participated in an after-school homework center to assist youth in at-risk communities with homework completions, behavior modification and skill development. Students participating have improved their grades by 30%. Parents and teachers have reported that the center has improved behavior that is a carryover in the class and home and the program provides a safe environment for the child.

The value of volunteerism in the U.S. as a result of Extension Programs is great. The value of the time, mileage, and out-of-pocket expenses that the 640,000 volunteer leaders in 4-H programs across the nation is estimated at \$2 billion dollars annually. In New Hampshire, for example, over 5,000 volunteers helped deliver Cooperative

Extension programs. Collectively, they gave 172,012 hours of service. Using the Independent Sector volunteer value of \$14.83 per hour, this volunteer contribution to New Hampshire Cooperative Extension is valued at \$2,550,937. If New Hampshire Extension hired full time staff to equal the time donated by volunteers, it would mean hiring over 85 full-time employees.

Land-grant Universities are promoting business programs in the states. As a result of **Texas** Extension education programs, 878 jobs were maintained in the 278 businesses assisted. Ninety one of these businesses expanded creating an additional 206 jobs. Fifty five new businesses were established creating 215 jobs. A total of 421 jobs were created. The total number of jobs increased from 878 to 1309. In **Oregon**, The Extension Energy program's Industrial Assessment Center helps Pacific Northwest manufacturers improve efficiency and reduce waste. Each year faculty-led teams of Oregon State University engineering students visit at least 25 manufacturing facilities in the region to assess plant operations, at no cost to the facility. Students benefit by gaining valuable practical experience. More than 370 firms that received on-site visits have realized an annual savings of \$70,000 per plant as a result of implementing recommendations made by the OSU teams. Total savings to industry from this program are more than \$25 million annually.

To create a value-added market for several alternative crops and aid community economic development, University of **Nebraska** worked with Cheyenne county to attract Pennington Seed Co., a grass and birdseed company, to Sidney, NE. Birdseed production has increased by about 100,000 acres, which translates into a new market worth \$10 million annually. These new crops help Panhandle farmers diversify their crop base. The new plant also provides jobs and other economic benefits to the community.

As a result of the Read & Succeed pilot program in **Ohio**, 55 percent of youth participants passed their reading proficiency tests last year compared to the 19 percent who passed in the previous year. Participation in the Read & Succeed program may have provided additional support for these youth to be successful on annual proficiency tests. Pre- and post-test results on overall attitude and interest in reading remained consistent after the 20 hours of participation. Moreover, noticeable increases in youths active participation in reading, homework completion, and dialogue were documented. **New Jersey** reported similar results in their literacy program. Eighty-four percent increased their interest in reading; 72% increased their enjoyment of reading, and 66% showed improvement in their reading skills.

**Analysis of Results:** The performance goal was met through the research and extension work of the CSREES State partners.

## **Management Initiative 1: Strengthen the Federal/State Partnership**

### **Key Performance Goals**

Identify and implement funding opportunities that promote the agricultural research, extension, and education capacity of minority-serving institutions.

Continued efforts were made to ensure that research, education, and extension programs meet the needs of underserved populations. For example, under programs targeted to the Nation's Tribal Colleges and Hispanic-Serving Institutions, awards were made to enhance faculty teaching competencies, update and expand curricula, enhance library resources, encourage the use of new technologies such as distance education, and recruitment and retention of multicultural students. In 2001, CSREES implemented the Alaska Native Serving and Native Hawaiian-Serving Institutions Education Grants Program to recruit, support and educate minority scientists and professionals, and advance the educational capacity of Native-serving institutions.

Encourage the participation of minority institutions in agency outreach efforts.

CSREES provided funding to several minority-serving institutions to develop new and expand existing partnerships by providing support for conferences and workshops costs. Conference and workshop topics included student recruitment and training, and national and global issues in the food and agricultural sciences.

Solicit and obtain input from CSREES stakeholders to address agricultural research, extension, and education issues and to develop approaches to problem-solving.

CSREES obtained input from the land-grant university system and the National Agricultural Research, Extension, Education, and Economics Advisory Board on national priorities in the development of the FY 2002 Agency budget estimate. CSREES obtained stakeholder input on the Initiative for Future Agriculture and Food Systems Program and the Integrated Research, Education, and Extension Competitive Grants Program. CSREES solicited input from stakeholders for the National Research Initiative Competitive Grants Program.

Identify and foster partnerships with other Federal Agencies to increase outside interest and support of CSREES activities.

CSREES received approximately \$27.1 million from other Federal agencies in FY 2001 to further activities that are of mutual interest to CSREES and the contributing agencies. For example, in FY 2001 CSREES received approximately \$7.9 million from the Foreign Agricultural Service to support the implementation of agriculture marketing assistance activities in Armenia.

## **Management Initiative 2: Integration of Research, Extension, and Education**

### **Key Performance Goal**

Develop and maintain an agenda for promoting the integration of research, extension, and education where possible.

CSREES continued to work with the land-grant university system to implement provisions of the Agricultural Research, Extension, and Education Reform Act of 1998 requiring that certain percentages of formula funds be dedicated to integrated extension and research activities.

CSREES expanded the Integrated Research, Education, and Extension Competitive Grants program to support integrated activities in water quality, food safety, pest management, and organic transition. Grants totaling \$40.2 million were funded in FY 2001.



### **Management Initiative 3: Improved Information Management Systems**

#### **Key Performance Goals**

Implement and Maintain the Research, Extension, and Education Information System (REEIS) for Use by the REE Agencies, USDA, and their Partners and Customers in Accessing Information

CSREES completed detailed requirements and project plans for the REEIS system. Approval was received from the USDA capital planning executive board to begin development. REEIS hardware, software, and development support were procured during FY 2001.

### **Management Initiative 4: Improving Financial Management within USDA**

#### **Key Performance Goals**

Implement integrated financial management systems in USDA

CSREES financial and budget staff participated in the REE-wide configuration and implementation of the Foundation Financial Information System (FFIS). These efforts were conducted in close coordination with the Office of Chief Financial Officer and the National Finance Center to ensure that FFIS was operational for all REE agencies by October 1, 2001, as mandated by the Department.

Correct internal control deficiencies in a timely manner

CSREES continued its compliance with Federal Managers' Financial Integrity Act (FMFIA) reporting requirements, including the timely completion of audit report recommendations and the timely correction of any FMFIA weaknesses that are identified.

Maintain and provide access to reliable cost accounting information

CSREES continued to work with the OCFO and NFC to implement and employ cost accounting principles to the maximum extent necessary to accomplish the agency mission.

CSREES performed all necessary biennial reviews of user charges as required by OMB Circular A-25, User Charges reviewed agency operations for new potential user fee situations.

Clean and timely audit opinion on audited financial statements

On behalf of the REE agencies, ARS coordinated the preparation of yearly Consolidated Financial Statements of the agencies in accordance with Departmental prescribed procedures, and as required under the Chief Financial Officer's Act.

<u>Compliance with Debarment and Suspension and Drug-Free Workplace Programs</u>
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CSREES continued to require all recipients of grants and/or cooperative agreements to comply with debarment and suspension and drug-free workplace requirements.